WHAT IS CLAIMED IS:

1. A square anti-symmetric uniformly redundant array coded aperture for imaging a source of non-focusable radiation, the coded aperture comprising transparent cells and opaque cells and exhibiting a full mask pattern, the full mask pattern having elements, the elements having values including a first value and a second value, the transparent cells and the opaque cells being respectively assigned locations corresponding to the elements having the first value and the second value, the full mask pattern being generated from a primitive mask pattern of order ν, having a center, the primitive mask pattern being defined by a relationship:

$$\begin{aligned} A_{ij} &= 0 && \text{if } i=0 \\ A_{ij} &= 1 && \text{if } j=0 \text{ and } i \neq 0 \\ A_{ij} &= 1 && \text{if } B_i=B_j \\ A_{ij} &= 0 && \text{otherwise} \end{aligned}$$

where A is a uniformly redundant array coding function and B is a skew-Hadamard quadratic residue sequence, the full mask pattern being constructed by repeating the primitive mask pattern diagonally outward from the center of the primitive mask pattern whereby the full mask pattern includes a total of $(2\nu - 1) \times (2\nu - 1)$ elements.

2. A square anti-symmetric uniformly redundant array coded aperture for imaging a source of non-focusable radiation, the coded aperture comprising transparent and opaque cells, the coded aperture being positionable in a first position and a second position rotatably offset from the first position by 90°, the coded aperture exhibiting a square normal mask pattern at

the first position, the coded aperture exhibiting a square complementary mask pattern at the second position whereby substantially all of the opaque cells exchange locations with substantially all of the transparent cells.

3. A method of constructing a square anti-symmetric uniformly redundant array coded aperture for imaging a source of non-focusable radiation, the coded aperture having transparent cells and opaque cells, the method comprising the steps of:

generating a primitive mask pattern of order ν, having a center, the primitive mask pattern being defined by a relationship:

$$A_{ij} = 0 \quad \text{if } i=0$$
$$A_{ij} = 1 \quad \text{if } j=0 \text{ and } i \neq 0$$
$$A_{ij} = 1 \quad \text{if } B_i=B_j$$
$$A_{ij} = 0 \quad \text{otherwise}$$

where A is a uniformly redundant array coding function and B is a skew-Hadamard quadratic residue sequence;

generating a full mask pattern having elements, the elements having values including a first value and a second value, the full mask pattern being generated by repeating the primitive mask pattern diagonally outward from the center of the primitive mask pattern whereby the full mask pattern includes a total of $(2\nu - 1) \times (2\nu - 1)$ elements; and

assigning the transparent cells and the opaque cells, respectively, to the elements of the full mask pattern having the first value and the second value.

4. A coded aperture imaging system for imaging a source of non-focusable radiation, the system comprising:

a coded aperture, the coded aperture including transparent cells and opaque cells, the coded aperture being positionable in a first position and a second position rotationally offset from the first position by 90°, the coded aperture exhibiting a square normal mask pattern at the first position, the coded aperture exhibiting a square complementary mask pattern at the second position whereby substantially all of the opaque cells exchange locations with substantially all of the transparent cells;

means for rotating the coded aperture between the first position and the second position, the coded aperture receiving non-focusable radiation emitted by the source at both the first position and the second position, the coded aperture generating a first coded shadow in response to the radiation received when the coded aperture is at the first position, the coded aperture generating a second coded shadow in response to the radiation received when the coded aperture is at the second position;

a position sensitive detector situated with respect to the coded aperture to allow the first coded shadow and the second coded shadow to sequentially impinge thereon, the position sensitive detector respectively generating a first coded optical signal and a second coded optical signal in response to the first coded shadow and the second coded shadow sequentially impinging thereon;

means for converting an optical signal to an electrical signal, the converting means being responsive to the first coded optical signal and the second coded optical signal and respectively generating a first coded electrical signal and a second coded electrical signal in response thereto; and

a signal processor, the signal processor being responsive to the first coded electrical signal and the

second coded electrical signal and decoding the first coded electrical signal and the second coded electrical signal, the signal processor generating an image signal therefrom, the image signal being representative of an image of the source of non-focusable radiation.

5. A coded aperture imaging system as defined in Claim 4, wherein the rotating means comprises:

an aperture retaining platform, the platform being positionable in an at least first position and an at least second position, the coded aperture being mounted on the platform;

a position encoder, the encoder being operatively coupled to the platform, the encoder being responsive to the rotational position of the platform and generating a position signal in response thereto, the position signal indicating whether the platform is in the at least first position or the at least second position;

a drive control unit, the drive control unit being electrically coupled to the position encoder, the drive control unit being responsive to the position signal and generating a drive control signal in response thereto; and

a stepper unit, the stepper unit being electrically coupled to the drive control unit and mechanically coupled to the platform, the stepper unit being responsive to the drive control signal and rotating the platform between the at least first position and the at least second position in response thereto.

6. A coded aperture imaging system as defined in Claim 5, wherein the position encoder is electrically coupled to the signal processor, the signal processor being responsive to the position signal of the position encoder, the signal processor processing the position

signal, the first coded electrical signal and the second coded electrical signal and thereby generating the image signal.

7. A coded aperture imaging system as defined in Claim 4, further comprising a display, the display being electrically coupled to the signal processor, the display including a visual representation of an area in the field of view of the imaging system and wherein the representative image of the source of non-focusable radiation responsive to the image signal is superimposed on the visual representation.

8. A coded aperture imaging system as defined in Claim 4, further comprising a data storage unit, the data storage unit being electrically coupled to the signal processor, the signal processor generating data signals, the data storage unit storing the data signals from the signal processor.

9. A coded aperture imaging system as defined in Claim 4, further comprising means for adjusting a separation distance between the coded aperture and the position sensitive detector, the adjusting means being operatively coupled to at least one of the coded aperture and the position sensitive detector, the adjusting means moving at least one of the coded aperture and the position sensitive detector with respect to the other thereby adjusting the separation distance.